for example, can be at once drawn by erecting an ordinate at the junction of the diagonal of the same bay with the bottom boom, equal to the product of the two parts into which the junction point divides the span, and joining the end of the ordinate with the ends of the span. An equally simple construction gives the line for any member of the bottom boom, and the influence lines for all the diagonals can be drawn by first drawing two parallel lines through the ends of the span; then if verticals are drawn through the end points of any bay to meet these respective lines, and the two points of intersection are joined, the line thus drawn, together with the two parallel lines, is the "influence line" for the given bay.

Part vi. is devoted to the description of, and calculations for, types of German, English and American cranes. This part of the book is particularly valuable, as theory and practice supplement each other in a way that is really helpful to designers. The last three sections are devoted to specifications, useful tables, and a valuable index to articles and papers on cranes. The book is excellently printed and well illustrated on very stiff paper. It can cordially be recommended to designers, builders, and users of all kinds of lifting and carrying machinery, and we can hardly think of a branch of mechanical engineering in which the book will not prove useful for reference. Students will also be well repaid by a careful study of the designs given and the calculations therewith, as they will be able to appreciate, perhaps, better than in any other way, the limitations of the theories upon which they are apt to place implicit trust.

F. C. L.

AN OXFORD CHAMPION OF DARWINISM.

Essays on Evolution, 1889–1907. By Prof. E. B. Poulton, F.R.S. Pp. xlviii+480. (Oxford: Clarendon Press, 1908.) Price 12*s.* net.

ON July 1, 1858, an epoch in the history of science was created by the reading, before the Linnean Society of London, of the papers by Darwin and Wallace on natural selection; and on July 1, 1908, the fiftieth anniversary of this momentous occasion was appropriately celebrated under the auspices of the same society. The publication of Prof. Poulton's volume is especially well timed, for it appears while the Darwin-Wallace commemoration is fresh in the minds of all, and while the weighty utterances by which the veterans Wallace and Hooker themselves so greatly added to the interest of the proceedings on that occasion are still a recent memory.

Among those men of science who have found their chief inspiration in the work of Darwin and Wallace, no one has laboured with greater perseverance and success than Prof. Poulton, and the present collection of essays embodies the main results of his investigations during his tenure of the Hope chair at Oxford. The memoirs have all in one form or another appeared before, but the author is not by any means content with a mere reprint of his former publications; he has, on the contrary, spared no pains to bring the treatment of his various topics up to date, and a comparison with the lectures and addresses in their original form will show that in many cases this must have involved considerable labour. But with so fertile and so rapidly growing a subject as that which Prof. Poulton has made his own, a period of nineteen years, which is that which separates the first essay in point of date from the present time, gives opportunity for enormous accessions of material, and almost inevitably involves some modification, if not in the principles, at least in the details of interpretation. The author has acted fairly towards his readers by ensuring that the essays here reprinted, though preserving the general form and tone in which they were originally framed, should nevertheless be the expression of his own present views, and should embody the principal points of evidence that have since come to light. The keynote of the book is the all-importance of natural selection, as propounded by Wallace and Darwin, in the interpretation of the past history and present condition of organic nature. The essays form a powerful reinforcement of what is properly and distinctively called the Darwinian theory of evolution, and should tend to reassure those weaker brethren who have allowed themselves to be persuaded or terrified into losing confidence in the work of the two great founders of rational evolutionary doctrine.

The greater number of Prof. Poulton's arguments and illustrations are naturally drawn from the wonderfully rich domain of insect bionomics. The way in which the great Oxford collection, so liberally established by Hope, and so assiduously tended by Westwood, has been made of late years to subserve the cause of scientific research and progress, especially in the unravelling of intricate problems of evolution, is one of the most remarkable features in the recent history of the University. The development of such studies in Oxford, of which the present volume is only one among many manifestations, should be a matter of cordial congratulation to the present Hope professor, on the part, not only of entomologists, but of all who take a rational interest in any department of biology.

Space would fail us in the attempt to give an adequate account of the contents of this stimulating book. A bare enumeration must suffice. First comes a discussion upon the age of the earth, comforting to those biologists who have been disturbed by certain physical calculations now in great measure abandoned. Next we have the question asked and answered, "What is a species?" Essays follow on the theories of evolution which rival or antagonise Darwin's, on the nature of heredity, and on the remarkable anticipation of Galton and Weismann by the anthropologist James Cowles Prichard. The Birmingham lecture on Huxley is of especial value, as it not only defines and accounts for the precise attitude of that great biologist towards the Darwinian theory, but also contains one of the most forcible and convincing pleas that we have yet seen for a more rational use in education of our present system of examinations. The three concluding essays, which show an immense command of facts, deal in a masterly manner with the fascinating subject of mimicry. They are especially remarkable as in-

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dicating the gradual trend of opinion towards a large substitution of the Müllerian interpretation for that of Bates.

A word must be added on a subject of some delicacy. Prof. Poulton's introduction, in which he deals with certain of the assertions and pretensions of the English school of Mendelians, is undeniably controversial, and even in places personal. The author has in several quarters been taken to task for his polemics. This reminds us of the old complaint:—

> Cet animal est très méchant;
> Quand on l'attaque, il se défend!

Controversy is necessary for the progress of science. Personalities, we think, are, as a rule, better avoided; but there are cases when the tone adopted by the assailant makes it impossible to offer an effective resistance except by the employment of methods which would at ordinary times be left unused. Prof. Poulton shows that he warmly appreciates the interest and value of Mendel's discovery, and the keenness and industry with which it is being followed up, but we think that he is justified in his protest against an attitude necessarily tending to discourage the younger workers in a field which, since the ground was first broken by the great naturalists lately commemorated and honoured, has proved the most fertile of all within the wide realm of the sciences of life.

The book is fitly dedicated to Prof. Meldola, to whom all Darwinians owe an immense debt of gratitude. It is furnished with an admirable index, and both paper and printing are worthy of the traditions of the Clarendon Press.

F. A. D.

ARCHÆOLOGY IN GREECE.

The Annual of the British School at Athens. No. XIII., Session 1906–7. Pp. xi+488+plates. (London: Macmillan and Co., Ltd., n.d.) Price 25*s.* net.

In this volume of the "Annual" the director and students of the British School at Athens describe the excavations at Sparta during the year 1907. The work at the temple of Artemis Orthia was carried on very successfully, and the results are most important for our knowledge of Laconian art of the early period (eighth to sixth centuries B.C.). Taking all in all, the early Spartans seem to have been much more civilised than one would have expected; and if, as is supposed by Mr. Droop, the so-called Cyrenaic style of vase-painting is really Spartan, they seem to have been originative artists.

The temple of Athena of the Brazen House, where, as we read in all our Greek histories, the renegade victor of Platæa, Pausanias the king, was walled up and died miserably, has also been excavated, with interesting results. We do not note that any particular conclusions as to possible date of foundation, &c., are drawn from the orientation of these buildings.

The two most interesting articles other than these are the continuations of Mr. Dickins's very able critical article on the sculptor Damophon of Messene, and of Dr. Mackenzie's on Cretan Palaces. Dr. Mackenzie now completes his argument against Prof. Ridgeway on the one side and Prof. Doerpfeld on the other as to the precise signification of the great discoveries in Crete. He is doubtless right against Prof. Ridgeway in maintaining that the people who built the palaces of Knossos and Phaistos were not Indo-Europeans, and did not speak any kind of Greek, and against Doerpfeld in denying that they had any Achæan blood, or that their work shows any Achæan influence. In fact, the Achæan theory was knocked on the head by Prof. Ridgeway's trenchant criticism in his "Early Age of Greece," and Prof. Doerpfeld's Achæanised Carians have been knocked on the head by Dr. Mackenzie.

The "Minoans" may have been akin to the Carians, but not to the Achæans, who were Aryan Greeks, which the Carians, Lycians, and others were not. Where Prof. Ridgeway went wrong was in making his "Pelasgians" (=Minoans) Aryans. Whether the Minoans were Pelasgians or not we cannot say; Prof. J. L. Myres has lately shown how very useless for practical purposes this elusive ethnic name is. Prof. Ridgeway made the Pelasgi a pre-Achæan wave of Aryan invaders. But if so, they cannot have been the builders of the Cretan palaces, who came from the south, not from the north. Dr. Mackenzie makes them non-Aryan like the Minoans, but thinks that, driven from Greece by the Aryan Achæans, they fell back upon their Minoan kinsmen in the islands and Crete, and overthrew the Minoan culture, building amid the ruins of the labyrinthine Minoan palaces their own halls of the Mycenæan and Tirynthian type, which we have hitherto regarded as Achæan. Thus the Minoans would be pre-Pelasgic as well as pre-Achæan. Dr. Mackenzie regards the well-known "Warrior Vase" from Mycenæ as Achæan, no doubt correctly, and the geometric pottery of the Dipylon as Dorian, a view which, although it was generally accepted a few years ago, has its difficulties. Perhaps it was Achæan too. If it was Dorian, why is it found in Attica? Are we to suppose that the Athenians of set purpose deleted from their history the fact that their land had at one time been Dorized?

H. R. Hall.

SYLVESTER'S MATHEMATICAL PAPERS.

The Collected Mathematical Papers of James Joseph Sylvester. Vol. ii. (1854–73). Pp. xvi+732. (Cambridge: University Press, 1908.) Price 18*s.* net.

Among the 110 papers contained in this volume there are five or six which represent the author at his best. First of all there are three on Newton's rule for the discovery of imaginary roots of equations; here we see Sylvester working his way from a laborious and partly tentative method to the simple and beautiful proof which is reproduced in Todhunter's "Theory of Equations." (It is not impossible, by the bye, that there may be a series of cubic functions of the coefficients which would give information supplementary to that afforded by Newton's

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